

SECTION 02228
CULVERT PIPE

PART I - GENERAL

- 1.01 This work shall consist of furnishing and installing, metal pipe and pipe appurtenances, including all excavation, bedding, and backfilling required to complete the work.
- 1.02 **Method of Measurement** - Culvert pipe will be measured by the actual number of linear feet of the kind, class or shape, and the several sizes and metal thickness, bedded, backfilled, and accepted in place. When ends of a round pipe culvert are cut on a skew or slope, measurement will be the average of the top and bottom centerline lengths.

Metal end sections, elbows, and branch connections shall be measured separately as "Each" under this Section.

PART II - PRODUCTS

2.01 **Corrugated Iron or Steel Pipe and Pipe Arches**

- A. **Riveted Pipe and Pipe Arches** - Not Used
- B. **Welded Pipe and Pipe Arches** - Corrugated metal pipe and pipe arches fabricated by resistance spot welding shall meet the applicable requirements of AASHTO M 36.
- C. **Helical Pipe** - Unperforated helically corrugated pipe with continuous lock or welded seams shall meet the applicable requirements of AASHTO M 36.
- D. **Coupling Bands** - Coupling bands shall meet the requirements of AASHTO M 36.
- E. **Special Sections** - Not Used
- F. **Flared End Sections** - Not Used

2.02 **Bituminous Coated Corrugated Iron or Steel Pipe and Pipe Arches** - Not Used

2.03 **Polymeric Precoated Steel Pipe, Pipe Arches, and Underdrains**

- A. Pipe shall meet the requirements of AASHTO M 245.
- B. Coupling bands shall meet the requirements of AASHTO M 245.
- C. Not Used
- D. Not Used

2.04 **Corrugated Iron or Steel Pipe For Underdrains, Plain Galvanized or Precoated** - Plain galvanized pipe shall meet the requirements of AASHTO M 36. Precoated underdrains shall meet the requirements of AASHTO M 245.

- 2.05 **Bituminous Coated Iron or Steel Pipe For Underdrains** - Not Used
- 2.06 **Corrugated Aluminum Alloy Culvert Pipe and Pipe Arches** - Not Used
- 2.07 **Corrugated Aluminum Alloy Pipe For Underdrains** - Not Used
- 2.08 **Bituminous Coated Corrugated Aluminum Alloy Culvert Pipe and Pipe Arches** - Not Used
- 2.09 **Bituminous Coated Corrugated Aluminum Alloy Pipe Underdrains** - Not Used
- 2.10 **Structural Plate For Pipe, Pipe Arches, and Arches** - Not Used
- 2.11 **Full Bituminous Coated Structural Plate Pipe, Pipe Arches, and Arches** - Not Used
- 2.12 **Aluminum Alloy Structural Plate For Pipe, Pipe Arches, and Arches** - Not Used
- 2.13 **Aluminum Coated (Aluminized Type 2) Corrugated Steel Pipe and Pipe Arches** - Not Used

PART III - EXECUTION

- 3.01 Water pollution and stream degradation shall be controlled.

Pipe which is installed in or which will affect streams that are DESIGNATED as important fisheries shall be installed only during those periods SHOWN ON THE DRAWINGS or in Special Project Specifications.

- 3.02 **Excavation** - Excavation for culverts shall be to the lines and grades or elevations SHOWN ON THE DRAWINGS or as DESIGNATED on the ground. Excavations shall be of sufficient size to permit the placing and backfilling of culverts. Boulders, logs, and any other unsuitable materials encountered shall be removed and disposed of in areas DESIGNATED ON THE DRAWINGS. The width of trenches shall permit satisfactory jointing and thorough tamping of the bedding material under and around the culvert.

Unsuitable foundation material shall be excavated below the invert of the culvert to an approximate depth of 2 feet and a width of at least the culvert diameter plus 4 feet. Unsuitable material shall be replaced with selected granular foundation material and compacted in accordance with paragraph 3.08.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 1 foot. The width of the excavation shall be at least 2 feet greater than outside width of the culvert. This excavated material shall be replaced with selected granular foundation material and compacted in accordance with paragraph 3.08.

- 3.03 **Utilization of Excavated Materials** - All suitable excavated material shall be utilized as backfill or embankment. No excavated material shall be placed in live streams. All surplus material shall be disposed of as SHOWN ON THE DRAWINGS. No excavated material shall be deposited in a manner that will endanger the partly finished structure.

- 3.04 **Bedding** - Not Used

3.05 **Laying Pipe** - No pipe shall be placed in service until a suitable outlet is provided.

Paved or partially lined pipe shall be laid so the longitudinal centerline of the paved segment coincides with the flowline.

Elliptical pipe shall be placed with the major axis within 5 degrees of a vertical plane through the longitudinal axis of the pipe.

The final installed alignment of all pipe shall have no sag and no point shall vary from a straight line drawn from inlet to outlet by more than 2 percent horizontally and vertically of the culvert length or 1 foot, whichever is less, unless otherwise SHOWN ON THE DRAWINGS.

Helically corrugated lock-seam pipe shall be installed with the seam at the inlet end placed below the horizontal centerline.

Longitudinal laps on riveted spot-welded pipe shall be positioned at any location between 45 degrees above or below horizontal.

- 3.6 **Joining Pipes** - Pipe shall be firmly joined by form-fitting coupling bands. End sections shall be attached to pipe by connecting bands or other means as recommended by the manufacturer. Rubber gaskets shall be installed at each joint to form a watertight connection when SHOWN ON THE DRAWINGS. Dimpled bands shall not be used when the slope of the pipe is greater than 25 percent.

The coupling bands shall meet the strength requirements of field joints for Non-Erodible Soil Condition--Special Joint Type according to Division 2, Section 23 of the "Standard Specification for Highway Bridges" by AASHTO.

3.07 **Shop Elongation** - Not Used

- 3.08 **Backfilling** - Pipe meeting any of the following conditions shall not be placed or back-filled until the excavation and foundation have been approved by the Contracting Officer:

- A. Embankment height greater than 10 feet at subgrade centerline.
- B. Installation in a live stream.
- C. Round pipe with a diameter of 48 inches or greater.
- D. Pipe arches with a span of 50 inches or greater.

After the bedding is prepared and the pipe is placed, selected material shall be placed in layers not exceeding 6 inches loose thickness and compacted under the haunches and alongside the pipe. The material shall have the moisture content needed for effective compacting. Backfill shall be readily compactible material free of frozen lumps, chunks of highly plastic clay, or other objectionable material. Rocks larger than 3 inches in diameter shall not be used within 1 foot of the pipe. On each side of the pipe there shall be an area of compacted material at least as wide as 2 diameters of the pipe or 12 feet, whichever is less. Backfill shall be compacted without damaging or displacing the pipe. The density shall be Class C with a minimum of three passes with heavy equipment or vibratory equipment in lifts of loose fill of no more than 9 inches thick. Backfilling and compacting shall be continued until the backfill is 12 inches above the top of the culvert. After

being bedded and backfilled pipe shall be protected by an adequate cover of embankment before heavy equipment is permitted to cross during roadway construction. Pipe distorted more than 5 percent of nominal dimension, ruptured, or broken shall be replaced.

END OF SECTION

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